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EXAMINER				
LEE, HSIEN MING				
ART UNIT		PAPER NUMBER		
2823				

DATE MAILED: 12/03/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/934,643

Applicant(s)

ARAKAWA, HIDEYUKI

Examiner

Hsien-Ming Lee

Art Unit

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☐ Responsive to communication(s) filed on 9/3/83
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1, 4-7 and 10 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 7 and 10 is/are allowed.
- 6) ☒ Claim(s) 1 and 4-6 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.  
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

## Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Remarks*

1. The objection to claims 1, 5 and 6 is withdrawn.
2. Claims 1, 4-7 and 10 are pending in the application.

### *Grounds of Rejection*

#### *Claim Rejections - 35 USC § 103*

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over applicant's admitted prior art (hereinafter refers to as "AAPA") in view of Masahiro et al. (JP 08-186117).

In re claim 1, AAPA, in Figs. 8-9 and related text, teaches the claimed semiconductor device, comprising:

- a conductive layer 10 (Fig. 8);
- a first contact 2 comprising a ball 2 on said conductive layer 10 (Fig. 8);
- a first bonding pad 6 spaced apart from said conductive layer 10 (Fig. 8); and
- a bonding wire 1 electrically connecting said first contact 2 to said first bonding pad 6 and forming a second contact 9. (Fig. 9).

AAPA does not teach that said second contact including at least two layers of said bonding wire, lying directly on each other, so that said bonding wire includes at least one reverse bend and one of the layers is contact with said first bonding pad.

Masahiro et al., however, in an analogous art of a wire bonding (Figs. 3a-3f), teach a bonding wire 4 having a second contact including at least *two layers* of said bonding wire 4 (i.e. the *reverse bend portion 8*), lying directly on each other, so that said bonding wire 4 includes at least one reverse bend 8 (Fig.3(d)) and one of the layers is contact with said first bonding pad 9/13, i.e. an end of one of two layers is contact with top surface of 9/13.

Therefore, at the time the invention was made, one of the ordinary skilled in the art would have been motivated to substitute the bonding wire 1 of AAPA having ball-type second contact 9 with the bonding wire 4 having reverse-bend type second contact of Masahiro et al., since by this manner it would provide a better bonding wire having second contact including two layers lying directly on each other and in contacting with the first bonding pad.

The *motivation/suggestions* for doing so would be to provide a simple means for bonding two contacts without being restricted to a special bump's structure; shortening a junction distance between two contacts; and improving a bond strength (sections [0044] and [0045]; Masahiro et al.).

In re claim 4, AAPA in view of Masahiro et al. also teach that the conductive layer 10 includes an inner lead 10 (Fig.8).

5. Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over AAPA in view of Masahiro et al. as applied to claims 1, 4, 7 and 10 above, and further in view of Hikita et al. (US 6,133,637).

AAPA in view of Masahiro et al. substantially teaches the claimed device except that the device comprises a base; a first and a second semiconductor elements mounted on the base with a die pad interposed between the base and the semiconductor elements; an external terminal on the rear surface of the base; and a sealing resin sealing the first and the second semiconductor elements.

However, Hikita et al. in an analogous art teach a device (Fig. 25), comprises a base 50, a first 14 and a second 16 semiconductor elements mounted on the base 50 with a die pad 21 interposed between the semiconductor element 14 and the base 50; a sealing resin 22 sealing the semiconductor elements 14 and 16; an external terminal 60 on the rear surface of the base 50; a bonding pad 14a on the first semiconductor element 14; and a bonding pad 16a on the second semiconductor element 16.

Therefore, it would have been obvious to one of the ordinary skill in the art at the time the invention was made to incorporate the device configuration of Hikita with the device of AAPA in view of Masahiro et al, since by this manner it would provide a resin-packaged semiconductor device having a plurality of semiconductor elements, which, in turn, would reduce the manufacturing cost of stacked chips (col. 25, lines 14-20, Hikita et al.).

***Allowable Subject Matter***

6. Claims 7 and 10 are allowed.

The prior art of record, AAPA, teaches the claimed method, as stated above.

In contrast, AAPA neither teaches nor suggests mechanically *deforming a second part* of said bonding wire, while said first part of said bonding wire is joined to the bonding pad, so that said *second part* of said bonding wire is *folded onto said first part* of said bonding wire directly

opposite said bonding pad *with said first part of said bonding wire between said bonding pad and said second part of said bonding wire* ; and joining said second part of said bonding wire to said first part of said bonding wire *while said first part of said bonding wire is on said bonding pad*.

Masahiro et al. teach mechanically deforming the bonding wire 4 (as shown in Fig.3( c)) to bend and curve said bonding wire 4 so that said first and second parts of said bonding wire being lying directly on each other and including one reverse bend 8 (i.e. crowing); and said second part of said bonding wire 4 is folded onto and joined said first part of said bonding wire 4 on said conductive layer 9/13.

In contrast, Masahiro et al neither teach nor suggest *second part of* said bonding wire 4 has said first part of said bonding wire *between* said bonding pad and said second part of said bonding wire ; and joining said second part of said bonding wire to said first part of said bonding wire *while said first part of said bonding wire is on* said bonding pad.

#### ***Response to Arguments***

7. Applicant's arguments have been fully considered but they are not persuasive for the reasons as follow.

In re claims 1 and 4, applicant argued that the ball 9 in AAPA does not include two layer of the bonding wire, lying directly on each other so that said bonding wire includes at least one reverse bend and one of the layers is contact with said first bonding pad. (second and third paragraphs of page 6).

Indeed, AAPA does not teach the aforementioned limitations. To remedy the deficiencies, the teachings of Masahiro et al. is used. The combined teachings of AAPA and Masahiro et al. would arrive the claimed invention, as recited in claims 1 and 4.

In regarding to the feature of the bonding wire, claim 1 merely recites "said bonding wire includes at least one reverse bend and one of the layers is contact with said first bonding pad." It does **not** specifically recite whether one of the layers is **point-contact** or **lying-contact** with said first bonding pad.

In comparison, Masahiro et al. teach that said bonding wire 4 having a **second contact** including at least **two layers** of said bonding wire 4, **lying directly on each other**, so that said bonding wire 4 includes at least **one reverse bend** 8 and one of the layers **is contact with** said first bonding pad 9/13 even though it is **point-contact** with said first bonding pad 9/13.

Thus, the teachings of Masahiro et al. would be able to remedy the deficiencies of AAPA. And the 103(a) rejection is deemed proper.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hsien-Ming Lee whose telephone number is 703-305-7341. The examiner can normally be reached on M-F (9:00 ~ 5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 703-306-2794. The fax phone number for the organization where this application or proceeding is assigned is 703-308-7382.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

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Hsien-Ming Lee

Examiner

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Nov. 25, 2003

A handwritten signature in black ink, appearing to read 'Hsien-Ming Lee', with a small mark above the first letter.